i. transformation of said microorganism with a recombinant nucleic acid molecule encoding glucosamine-6-phosphate synthase which has glucosamine-6-phosphate synthase activity; and

ii. genetic modification of a gene encoding glucosamine-6-phosphate synthase that increases the activity of said glucosamine-6-phosphate synthase, wherein said genetic modification results in at least one nucleic acid modification selected from the group consisting of deletion, insertion, and substitution of at least one nucleotide of said gene encoding glucosamine-6-phosphate synthase, said at least one nucleotide modification resulting in increased glucosamine-6-phosphate synthase activity;

wherein said step of culturing produces and accumulates a product selected from the group consisting of glucosamine-6-phosphate and glucosamine from said microorganism; and

b. recovering and purifying said product.

41. The method of Claim 40, wherein said glucosamine-6-phosphate is intracellular and said glucosamine is extracellular, wherein said step of recovering comprises a recovering step selected from the group consisting of recovering said glucosamine-6-phosphate from said microorganism, recovering said glucosamine from said fermentation medium, and a combination thereof.

42. The method of Claim 40, wherein said product is intracellular glucosamine-6-phosphate and said step of recovering comprises isolating said glucosamine-6-phosphate from said microorganism.

43. The method of Claim 40, wherein said product is intracellular glucosamine-6-phosphate and said step of recovering further comprises dephosphorylating said glucosamine-6-phosphate to produce glucosamine.

44. The method of Claim 40, wherein said step of culturing comprises maintaining said source of carbon at a concentration of from about 0.5% to about 5% in said fermentation medium.

45. The method of Claim 40, wherein said step of culturing is performed at a temperature from about 30°C to about 40°C.

46. The method of Claim 40, wherein said step of culturing is performed at about 30°C.

47. The method of Claim 40, wherein said step of culturing is performed in a fermentor.

48. The method of Claim 47, wherein said step of culturing is performed under conditions wherein glucose is added to said fermentation medium at a rate in which glucose accumulation in said fermentation medium is undetectable.

49. The method of Claim 47, wherein said step of culturing is performed so that an excess of glucose is maintained.

50. The method of Claim 40, wherein said step of culturing produces and accumulates at least about 21 mg/L of said product.

51. The method of Claim 40, wherein said step of culturing produces and accumulates at least about 1 g/L of said product.

Q1 52. The method of Claim 40, wherein said step of culturing produces and accumulates at least about 5 g/L of said product.

53. The method of Claim 40, wherein said genetic modification comprises transformation of said microorganism with a recombinant nucleic acid molecule encoding glucosamine-6-phosphate synthase which has glucosamine-6-phosphate synthase enzymatic activity, wherein said recombinant nucleic acid molecule is operatively linked to a transcription control sequence.

54. The method of Claim 53, wherein said recombinant nucleic acid molecule is integrated into the genome of said microorganism.

55. The method of Claim 53, wherein said recombinant nucleic acid molecule encoding glucosamine-6-phosphate synthase comprises a genetic modification which increases the activity of said glucosamine-6-phosphate synthase.

56. The method of Claim 40, wherein said recombinant nucleic acid molecule encoding glucosamine-6-phosphate synthase or said gene encoding said glucosamine-6-phosphate synthase comprises a genetic modification which reduces glucosamine-6-phosphate product inhibition of said glucosamine-6-phosphate synthase.

57. The method of Claim 40, wherein said microorganism has at least one additional genetic modification in a gene encoding a protein selected from the group consisting of *N*-acetylglucosamine-6-phosphate deacetylase, glucosamine-6-phosphate deaminase, *N*-acetyl-glucosamine-specific enzyme II^{Nag}, phosphoglucosamine mutase, glucosamine-1-phosphate

acetyltransferase-*N*-acetylglucosamine-1-phosphate uridyltransferase, phosphofructokinase, Enzyme II^{Glc} of the PEP:glucose PTS, and EIIM,P/III^{Man} of the PEP:mannose PTS, wherein said genetic modification decreases the activity of said protein.

58. The method of Claim 40, wherein said microorganism has at least one additional genetic modification in a gene encoding a phosphatase, wherein said genetic modification increases the activity of said phosphatase.

59. The method of Claim 40, wherein said microorganism has additional modifications in genes encoding the following proteins: *N*-acetylglucosamine-6-phosphate deacetylase, glucosamine-6-phosphate deaminase and *N*-acetyl-glucosamine-specific enzyme II^{Nag};

wherein said genetic modification decreases the activity of said proteins.

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60. The method of Claim 40, wherein said microorganism has additional modifications in genes encoding *N*-acetylglucosamine-6-phosphate deacetylase and glucosamine-6-phosphate deaminase;

wherein said genetic modification decreases the activity of said proteins.

61. The method of Claim 60, wherein said genetic modification is a deletion of at least a portion of said genes.

62. The method of Claim 40, wherein said microorganism is selected from the group consisting of bacteria and yeast.

63. The method of Claim 40, wherein said microorganism is a bacterium of the genus *Escherichia*.

64. The method of Claim 40, wherein said microorganism is *Escherichia coli*.

65. The method of Claim 64, wherein said microorganism comprises at least one additional genetic modification which is a mutation in an *Escherichia coli* gene selected from the group consisting of *nagA*, *nagB*, *nagC*, *nagD*, *nagE*, *manXYZ*, *glmM*, *pfkB*, *pfkA*, *glmU*, *glmS*, *ptsG* and a phosphatase gene, wherein said genetic modification decreases the activity of a protein encoded by said gene.

66. The method of Claim 40, wherein said microorganism is a yeast.

67. A microorganism for producing glucosamine by a biosynthetic process, said microorganism being transformed with a recombinant nucleic acid molecule comprising a nucleic

acid sequence encoding glucosamine-6-phosphate synthase, said nucleic acid sequence being operatively linked to a transcription control sequence and comprising a genetic modification which increases the activity of said glucosamine-6-phosphate synthase;

wherein expression of said nucleic acid sequence increases production of glucosamine by said microorganism.

68. The microorganism of Claim 67, wherein said microorganism has at least one additional genetic modification in a gene encoding a protein selected from the group consisting of *N*-acetylglucosamine-6-phosphate deacetylase, glucosamine-6-phosphate deaminase, *N*-acetyl-glucosamine-specific enzyme II^{Nag}, phosphoglucosamine mutase, glucosamine-1-phosphate acetyltransferase-*N*-acetylglucosamine-1-phosphate uridyltransferase, phosphofructokinase, Enzyme II^{Glc} of the PEP:glucose PTS, and EIIM,P/III^{Man} of the PEP:mannose PTS, wherein said genetic modification decreases the activity of said protein.

69. The microorganism of Claim 67, wherein said microorganism has at least one additional genetic modification in a gene encoding a phosphatase, wherein said genetic modification increases the activity of said phosphatase.

70. A method to produce glucosamine by fermentation, comprising:

a. culturing in a fermentation medium comprising assimilable sources of carbon, nitrogen and phosphate, a microorganism having at least one genetic modification that increases the activity of glucosamine-6-phosphate synthase wherein said genetic modification is selected from the group consisting of:

i. transformation of said microorganism with a recombinant nucleic acid molecule encoding glucosamine-6-phosphate synthase which has glucosamine-6-phosphate synthase activity; and

ii. genetic modification of a gene encoding glucosamine-6-phosphate synthase that increases the activity of said glucosamine-6-phosphate synthase, and wherein said genetically modified microorganism is produced by a process comprising the steps of:

(1) generating modifications in an isolated nucleic acid molecule comprising a nucleic acid sequence encoding glucosamine-6-phosphate synthase to create a plurality of modified nucleic acid sequences;

(2) transforming microorganisms with said modified nucleic acid sequences to produce genetically modified microorganisms;

(3) screening said genetically modified microorganisms for glucosamine-6-phosphate synthase activity; and,

(4) selecting said genetically modified microorganisms which have increased glucosamine-6-phosphate synthase activity;

wherein said step of culturing produces a product selected from the group consisting of glucosamine-6-phosphate and glucosamine from said microorganism; and,

b. recovering said product.